SECTION 16415

AUTOMATIC TRANSFER SWITCH

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

A. This Section includes transfer switches rated 600 V and less, including the following:
   1. Automatic transfer switch.
   2. Bypass/isolation switch.
   3. Remote annunciation system.

B. Related Sections: Include the following:
   1. Section 16111, Conduit and Fittings.
   2. Section 16120, Building Wire and Cable, 600 V and Below.
   3. Section 16231, Packaged Engine Generator.
   4. Section 16450, Grounding.

1.3 REFERENCES

A. Code of Federal Regulations (CFR):
   1. 29 CFR 1910.7, 1998 Occupational Safety and Health Administration.

B. National Fire Protection Association (NFPA):
   1. NFPA 70, 1999 National Electrical Code.
   2. NFPA 99, 1996, Standard for Health Care Facilities.
   3. NFPA 110, 1996, Standard for Emergency and Standby Power Systems.

C. Underwriters Laboratories, Inc. (UL):
   1. UL 1008, 1996, Transfer Switch Equipment.
   2. UL 508, 1993, Industrial Control Equipment.
   3. UL 489, 1991, Molded Case Circuit Breakers, and Circuit Breaker Enclosures.
   4. UL 869A, 1993, Standard for Service Equipment.

D. National Electrical Manufacturers' Association (NEMA):
   1. NEMA ICS1, 1993, Industrial Control and Systems General Requirements.
   2. NEMA 250, 1991, Enclosures for Electrical Equipment.
   3. NEMA AB1, 1993, Molded Case Circuit Breakers and Molded Case Switches.
   4. NEMA ICS6, 1993, Industrial Control and Systems Enclosures.

E. Institute of Electrical and Electronics Engineers (IEEE):
   1. IEEE C62.41, 1991, Recommended Practice on Surge Voltages in Low Voltage AC Power Circuits.

1.4 SUBMITTALS

A. Product Data: Include ratings and dimensioned plans, sections, and elevations showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.

B. Wiring Diagrams: Detail wiring for transfer switches and differentiate between manufacturer-installed and field-installed wiring. Show both power and control wiring.

C. Single-Line Diagram: Show connections between transfer switch, bypass/isolation switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.

D. Product Certificates: Signed by manufacturer certifying that products furnished comply with requirements and that switches have been tested for load ratings and short-circuit closing and withstand ratings applicable to units for Project.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

F. Field Test Reports: Indicate and interpret test and inspection results for compliance with performance requirements.

G. Maintenance Data: For each type of product specified in PART 2. Include all features and operating sequences, both automatic and manual. List all factory settings of relays and provide relay-setting and calibration instructions, including software, where applicable.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain a service center capable of providing emergency maintenance and repairs at Project site with an eight-hour maximum response time.

B. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the InterNational Electrical Testing Association and that is acceptable to authorities having jurisdiction.
   1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies (Level 3 or higher), to supervise on-site testing specified in Part 3.

C. Source Limitations: Obtain automatic transfer switch, bypass/isolation switch, nonautomatic transfer switch, remote annunciators, and control panels from manufacturer as directed by the Construction Manager.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, for emergency service under UL 1008, by a testing agency acceptable to authorities having jurisdiction.

E. Comply with NEMA ICS 1.

F. Comply with NFPA 70.

G. Comply with NFPA 99.

H. Comply with NFPA 110.

I. Comply with UL 1008, unless requirements of these Specifications are stricter.

1.6 DELIVERY, STORAGE, AND HANDLING

A. The materials covered in this section are directed procurement. Materials shall be provided same as any other materials covered in this contract.

B. Deliver equipment as a factory-assembled module with protective crating and covering.

C. Lift and support units with manufacturer's designated lifting or supporting points

1.7 SEQUENCING AND SCHEDULING

A. Coordinate size and location of concrete housekeeping bases. Cast anchor-bolt inserts into base.

B. Coordinate size and location of structural-steel support members.

PART 2 - PRODUCTS

2.1 AUTOMATIC TRANSFER SWITCH

A. Automatic Transfer Switches are included as part of the directed procurement program for this project. The Construction Manager is administering the program and equipment shall be purchased in accordance with program requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine rough-in for switches to verify area is ready to accept equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Floor-Mounted Switch: Level and anchor unit to floor.

B. Annunciator and Control Panel Mounting: Flush in wall, unless otherwise indicated.

C. Identify components according to Division 16, Section 19196.

3.3 WIRING TO REMOTE COMPONENTS

A. Match type and number of cables and conductors to control and communications requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.

3.4 CONNECTIONS

A. Ground equipment as indicated and as required by NFPA 70.

3.5 FIELD QUALITY CONTROL

A. Testing: Test transfer-switch products by operating them in all modes. Perform tests recommended by manufacturer under the supervision of manufacturer's factory-authorized service representative. Correct deficiencies and report results in writing. Record adjustable relay settings.

B. Testing: Engage a qualified independent testing agency to perform the following field quality-control testing:

C. Testing: Perform the following field quality-control testing under the supervision of the manufacturer's factory-authorized service representative in addition to tests recommended by the manufacturer:
   1. Before energizing equipment, after transfer-switch products have been installed:
      a. Measure insulation resistance phase-to phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Meet manufacturer's specified minimum resistance.
      b. Check for electrical continuity of circuits and for short circuits.
      c. Inspect for physical damage; proper installation and connection; and integrity of barriers, covers, and safety features.
      d. Verify that manual transfer warnings are properly placed.
      e. Perform manual transfer operation.
   2. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
      a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
      b. Simulate loss of phase-to-ground voltage for each phase of normal source.
      c. Verify time-delay settings.
      d. Verify pickup and dropout voltages by data readout or inspection of control settings.
      e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
      f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for one pole deviating by more than 50 percent from other poles.
      g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown sequence.

D. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.
   1. Assist in verifying grounding connections and locations and ratings of sensors.
   2. Assist in observing reaction of circuit-interrupting devices when simulated fault current is applied at sensors.

E. Coordinate tests with tests of generator plant and run them concurrently.

F. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.6 CLEANING

A. After completing equipment installation, inspect unit components. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

B. Clean equipment internally, on completion of installation, according to manufacturer's written instructions.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Construction Manager identified personnel to adjust, operate, and maintain transfer switches and related equipment as specified below:
   1. Coordinate this training with that for generator equipment.

2. Train selected maintenance personnel on procedures and schedules for operating, troubleshooting, servicing, and maintaining equipment.
3. Review data in maintenance manuals. Refer to General and Supplementary Conditions section, "Contract Closeout."
4. Review data in maintenance manuals. Refer to General and Supplementary Conditions section, "Operation and Maintenance Data."
5. Schedule training with Construction Manager with at least seven days' advance notice.
6. Provide a minimum of four hours of instruction.

END OF SECTION 16415